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Claims

[c1] 1.A computed tomography (CT) reconstruction method, the method comprising:
implementing an iterative image reconstruction process for CT metrology of an object, wherein said iterative reconstruction process utilizes an accurate forward projection.

[c2] 2.The method of claim 1, wherein said accurate forward projection includes using a polychromatic x-ray acquisition model.

[c3] 3.The method of claim 2, wherein using a polychromatic x-ray acquisition model further comprises:
decomposing a linear attenuation coefficient into a photoelectric component and a Compton scatter component; and
constraining a relative weight of said photoelectric component and said Compton scatter component based on prior material assumptions.

[c4] 4.The method of claim 1, wherein said accurate forward projection includes incorporating finite x-ray beamwidth considerations, said finite x-ray beamwidth considera-

tions including at least one of: detector point-spread function, detector aperture, detector cross-talk, focal-spot size, off-focal radiation, azimuthal blur, and detector memory effects.

[c5] 5.The method of claim 1, wherein said accurate forward projection includes incorporating scatter radiation considerations.

[c6] 6.The method of claim 1, wherein said iterative image reconstruction process implements at least one of: an iterative filtered back projection (IFBP) algorithm, a maximum a posteriori probability (MAP) algorithm, a maximum likelihood (ML) algorithm, an algebraic reconstruction technique (ART) algorithm, an Entropy-based algorithm, a Least Squares (LS) algorithm and a Penalized Weighted Least Squares (PWLS) algorithm.

[c7] 7.A method for implementing an iterative reconstruction of a computed tomography (CT) image, the method comprising:
during each of a plurality of iterations, generating a reconstructed image;
constraining said reconstructed image by utilizing prior outer edge information obtained from a modality in addition to CT;
transforming said reconstructed image to a projection

domain so as to generate a calculated sinogram; and determining at least one of a correction image and a corrected image based on said calculated sinogram and a measured sinogram.

[c8] 8.The method of claim 7, wherein modality in addition to CT further comprises one of: a coordinate measuring machine (CMM), a micrometer, and a laser-based measurement system.

[c9] 9.The method of claim 8, further comprising:
following the completion of said plurality of iterations, using a resulting completed reconstructed image and said prior outer edge information to generate a 3D point cloud of the CT image.

[c10] 10.The method of claim 7, wherein said generating a reconstructed image is implemented through at least one of: an iterative filtered back projection (FBP) algorithm, a maximum a posteriori probability (MAP) algorithm, a maximum likelihood (ML) algorithm, an algebraic reconstruction technique (ART) algorithm, an entropy-based algorithm, a least squares (LS) algorithm and a penalized weighted least squares (PWLS) algorithm.

[c11] 11.A method for implementing an iterative reconstruction of a computed tomography (CT) image, the method

comprising:

during each of a plurality of iterations, generating a reconstructed image;

constraining said reconstructed image utilizing prior outer edge information obtained from a modality in addition to CT and transforming said reconstructed image to the projection domain so as to generate a calculated sinogram; and

determining at least one of a correction image or a corrected image based on said calculated sinogram and a measured sinogram;

wherein the iterative reconstruction utilizes an accurate forward projection in determining said calculated sinogram.

[c12] 12.The method of claim 11, wherein said modality in addition to CT further comprises one of: a coordinate measuring machine (CMM), a micrometer, and a laser-based measurement system.

[c13] 13.The method of claim 12, further comprising:

following the completion of said plurality of iterations, using a resulting completed reconstructed image and said prior outer edge information to generate a 3D point cloud of the CT image.

[c14] 14.The method of claim 11, wherein said generating a

reconstructed image is implemented through at least one of: an iterative filtered back projection (IFBP) algorithm, a maximum a posteriori probability (MAP) algorithm, a maximum likelihood (ML) algorithm, an algebraic reconstruction technique (ART) algorithm, an entropy-based algorithm, a least Squares (LS) algorithm and a penalized weighted least squares (PWLS) algorithm.

[c15] 15.The method of claim 11, wherein said accurate forward projection includes using a polychromatic x-ray acquisition model.

[c16] 16.The method of claim 15, wherein using a polychromatic x-ray acquisition model further comprises:
decomposing a linear attenuation coefficient into a photoelectric component and a Compton scatter component; and
constraining a relative weight of said photoelectric component and said Compton scatter component based on prior material assumptions.

[c17] 17.The method of claim 11, wherein said accurate forward projection includes incorporating finite x-ray beamwidth considerations, said finite x-ray beamwidth considerations including at least one of detector point-spread function, detector aperture, detector cross-talk, focal-spot size, off-focal radiation, azimuthal blur, and

detector memory effects.

[c18] 18.The method of claim 11, wherein said accurate forward projection includes incorporating scattered radiation considerations.

[c19] 19.A storage medium, comprising:
a machine readable computer program code for implementing an iterative reconstruction of a computed tomography (CT) image; and
instructions for causing a computer to implement a method, the method further comprising:
during each of a plurality of iterations, generating a reconstructed image;
modifying said reconstructed image by utilizing prior outer edge information obtained from a modality in addition to CT;
transforming said modified, reconstructed image to a projection domain so as to generate a calculated sinogram; and
determining at least one of a correction image and a corrected image based on said calculated sinogram and a measured sinogram;
wherein the iterative reconstruction utilizes accurate forward projection constraints in determining said calculated sinogram.